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Economic Implications of US Participation
in Siberian Development

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A. The Soviet Stake in Siberian Development

Siberia occupies over half of the USSR's land mass and by Soviet estimates contains 3/4 or more of the country's reserves of coal, natural gas, major nonferrous metals, mature timber, and hydroelectric resources. Most of this wealth has not been exploited because abundant reserves have been available near existing population centers in the European USSR. The depletion of these resources is now forcing the Soviet leaders to look toward Siberia for future needs and to ponder ways to supply the area with the necessary capital, labor and technology.

Soviet leaders have dreamed of Siberian development for strategic and ideologic as well as economic reasons. Diversified development east of the Urals at one time was deemed desirable as a protection against invading European armies. More recently, it promised to provide a more difficult target in case of nuclear attack and to give logistical support to the armies facing China. Also, Siberian development would promote the official policy of equalizing economic levels among regions and republics.

Post-War Development

Accelerated development of Siberia as an economic goal began in the mid-1950s with the utopian ideal of making the larger uninhabited eastern regions into mirror

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of the developed European areas of the USSR.

Ambitious agricultural and industrial programs were introduced that required a large increase in investment funds and the mass movement of people eastward:

- During 1953-58, 70 million acres of "virgin lands" were plowed in Siberia and Kazakhstan to relieve the pressure on the traditional farm areas for food grains. More than 70,000 people were drafted for this effort.
- During 1956-60 capital investment in Siberia was to rise by 100% compared with 67% for the whole country.
- The 1959-65 Plan projected higher growth rates than in the European USSR for almost every Siberian industrial sector.

Although these programs brought unprecedented development to Siberia, the rates of growth of investment and thus industrial output were not as large as planned.

During the Seven-Year Plan (1959-65) investment in all of the RSFSR grew by 48.5% while that of Siberia was only 3-1/2 percenta of the 1960s, higher. During the whole decade industrial output of the eastern regions grew somewhat faster than the national average but their share in the RSFSR's industrial output grew very little. As a consequence, the share of national output contributed by the East and West Siberian and the Far East economic regions has increased slowly over the years (Table 1).

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Table 1
Siberian Share of Production of
Selected Commodities 1/

	<u>(Percent)</u>			
	<u>1940</u>	<u>1960</u>	<u>1970</u>	<u>Forecast 1980</u>
Electric power	6.6	15.0	17.8	20
Crude oil extraction	1.6	1.1	9.6	50
Gas	--	0.7	5.6	32
Coal	23.5	28.0	31.9	N.A.
Steel	10.4	8.4	8.1	10
Chemical fibers	--	15.8	13.0	30
Timber	22.9	25.7	32.8	N.A.

1. West Siberia, East Siberia, and Far East.

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The realization that Siberian development would be an extremely costly process that would pay few immediate dividends led to a deemphasis of development in remote regions during the late 1960s.

- Investment projects elsewhere that would bring an immediate boost to the sagging economic growth rates were favored.

- Failure to attract and hold a sufficiently skilled labor force was the biggest deterrent to development.

During the 1960s, 924,000 more persons left Siberia than arrived. The Soviets had estimated that an eastward movement of 6 million workers was required in 1959-65. Total population increase during that time was only 3.5 million; the labor migration goal was met by only 10%-15% at best.

Selective Development in the 1970s

The mixed results of the ambitious programs of the 1950s and changing requirements caused a shift in Siberian development strategy.

- Development will be focused on those raw materials that can be developed most cheaply -- coal, oil and gas, and ferrous metals in West Siberia; electric power and energy-intensive industries

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in East Siberia; wood and fish products, nonferrous metals, and some machinery in the Far East.

- Western areas of Siberia generally will be developed first since they are closer to markets and transport networks.
- All-around development will be concentrated in specific areas, especially in territorial-production complexes, which include interrelated enterprises of different branches of industry.
- Development will focus on capital-intensive projects. Oil and gas projects will require fewer than a half million workers. Siberia's population, according to Soviet estimates, will be 30-35 million by the year 2000, still constituting only about 10% of the total population.
- The Soviets decided to seek help from the West for machinery, technology, and financing for Siberian projects.

Reasons for Lagging Development

Siberian development has fallen short of plan for several good economic reasons. First of all the Siberian projects must compete with other resource claimants. For example, the leadership has already heavily committed itself to developing the non-black soil zone of the RSFSR during 1976-90, and 26% of all investment funds for 1976-80 are earmarked for the agricultural sector.

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In addition, each ruble invested in eastern development produces less output than in a comparable project in the Western USSR. Large social overhead outlays are required for education, housing, and the like. An Academy of Sciences Institute in the Far East has estimated that the cost of Soviet creating one job at a new industrial site in the Far East is four times that at an existing site. Transportation and communications networks must also be developed since major markets and processing facilities are still in the Western USSR.

But the major obstacle to Siberian development has been the shortage of labor in the East. For forty years special material incentives have been extended to workers settling in Siberia, including higher wages, longer annual leave, increased pension rights and certain privileges in education and housing. These incentives, however, have not been sufficient to compensate for the hardships of Siberian life. The high cost of living eats up much of the wage differential. According to estimates of the Siberian Research Institute on Labor, pay in the eastern regions has to be 38% higher to provide normal living standards than in the south and 26% more than in the central areas.

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Moreover, the housing, education, medical care, and other services do not measure up to the standards in the European SSSR despite Brezhnev's recognition in 1966 that "To develop the economies of Siberia and the Far East faster, it is essential to establish a number of social, economic measures...which will help strengthen the labor forces there." Investment allocations in East Siberia during 1966-70 suggest the neglect of consumer-oriented sectors. A 90% increase in so-called non-productive investment was planned; actual growth was only 28%. Within this total, investment in housing construction was scheduled to increase by 80% but grew by only 20%.

The Outlook for the Next 15 to 20 Years

Although long an objective of Soviet planners, Siberian development has become a matter of necessity if future needs of the USSR and of its client states in Eastern Europe are to be met.

Energy

Continued economic growth must be supported by an adequate energy and raw materials base. At present some 75% of the energy produced in the Soviet Union is consumed in the more heavily populated and industrialized European part of the country, although more than $\frac{4}{5}$ of the energy resources are located east of the Urals.

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Through 1990, 80% of the increase in Soviet production of energy is scheduled to come from Siberia. The hydroelectric power potential of European rivers has been almost fully developed. Extraction of coal in the older producing regions is becoming more difficult and expensive as work must be conducted at greater depths. Rates of increase in production of oil and gas from older producing fields are slowing down as reserves are depleted. The percentage of water contained in total fluid pumped from oil fields in the Urals-Volga region has been increasing rapidly, and production costs have risen with the need for employing secondary recovery methods and for drilling to greater depths in search of new reserves.

Development of the enormous hydroelectric power potential of the Siberian rivers is already under way. The world's largest hydroelectric powerplants have been built at Krasnoyarsk (capacity: 6,000 megawatts) on the Yenisey River and at Bratsk (4,100 MW) on the Angara River. The capacity of hydroelectric powerplants in the Angara-Yenisey region, which at present is 11,200 MW, is expected to be about 27,000 MW by 1985 and 60,000 MW may be reached by the end of the century. A complex of 10 large thermal electric powerplants, with a combined capacity of 50,000 MW-60,000 MW, is to be built in the Kansk-Achinsk brown coal basin, which extends for several hundred miles along both sides of the Trans-Siberian

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railroad in the general vicinity of Krasnoyarsk. This basin, which contains an estimated 1.2 trillion tons of coal, is tentatively scheduled to be producing 350 million tons annually by 1990. The availability of low-cost electric power brings with it other developments.

Large, modern aluminum plants have been built at Bratsk, Irkutsk, and Krasnoyarsk to take advantage of the electric power made available by the hydroelectric plants in those locations. Bratsk, which began as a construction camp for workers building the powerplant, has become a city of 175,000. By 1990, a city of 150,000 is planned around the large hydroelectric plant soon to begin operation at Ust Ilimsk.

The oil and gas fields of Tyumen Oblast in Western Siberia are contributing almost all of the present increases in petroleum production. West Siberian production of crude oil will account for about 30% of total Soviet output in 1975, and approximately one-half by 1980. After 1980, technical problems may cause production from West Siberian fields to slow down somewhat, and additional increases in output will have to come from new reserves as yet undiscovered. Soviet geologists have been instructed to increase their efforts in exploring East Siberia, an area where geological conditions, climate, and logistic problems will be even more troublesome than in West Siberia.

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To maintain its position as a net exporter of oil during the next 15-20 years, the USSR will have to reduce drastically the rate of increase in oil consumption. Apparently some of this reduction is to be accomplished by substituting natural gas, which is more readily available. No matter what course the USSR takes, its role in world oil trade will remain small during the next 15-20 years. On the other hand, Soviet exports of natural gas -- primarily from new fields in Siberia -- could contribute some 10% of the Western Europe's total gas supply during the 1980s and would earn sizable amounts of hard currency.

Chemicals

The availability of cheap energy resources, abundant sources of hydrocarbons, large salt deposits, and improved means of pipeline and rail transport will lead to extensive development of Siberia's chemical industry over the next 20 years. Although the potential for large-scale production of chemicals in Siberia has always existed, progress in this area has been hampered by the slow pace of development of the raw material base, the low level of Soviet chemical technology, and the lack of infrastructure in the eastern areas. Now, however, conditions are more

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favorable. Natural gas, produced in association with oil, is being flared -- wasting a potentially rich source of chemical raw material. Shortages and high prices in the West have encouraged the exchange of Soviet chemical intermediates and end-products for Western chemical equipment and technology.

Minerals and Metals

The USSR is also counting heavily on Siberia to help meet domestic needs for minerals and metals during the next 20 years and to contribute a surplus for export. Siberia's role will be especially important in the aluminum industry. Existing plants in Siberia are to be expanded, and the USSR is seeking western help in building four additional large Siberian plants with combined capacity roughly equal to that of the present Soviet aluminum industry. A major share of the increase in Soviet copper production over the next 20 years will also come from Siberia. Western participation is being sought in development of the large Udogan copper deposit east of Lake Baikal. Expansion of facilities for production of copper, nickel, and platinum group metals is already under way, with Finnish assistance, at Norilsk. All of these metals will contribute to foreign exchange earnings, as will increased output of Siberian diamonds.

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The Role of Western Assistance

The USSR undoubtedly can and will carry out its plans for developing the hydroelectric power potential of Siberia without outside assistance. It has built the largest hydroelectric powerplants and generating units in the world. Construction of large thermal electric powerplants and high-voltage long distance transmission lines probably would be facilitated by some western technical cooperation and assistance. With or without such assistance, however, an impressive number (perhaps 10) of large plants will be built to use Siberian coal in generating electric power. Initially the power probably will be used in Siberia, but within the next decade transmission facilities should be able to deliver power to the European part of the country.

The brown coal deposits of the Kansk-Achinsk basin probably will be developed -- primarily for domestic use -- entirely with Soviet resources. In exploiting the Chulman coking coal deposits of Eastern Siberia -- largely for export to Japan -- the USSR is counting on Japanese financial and technical support.

The USSR undoubtedly could develop Siberia's oil and gas without Western assistance. The pace of development of onshore resources would be slower -- perhaps by 3 to 5 years longer. Without extensive Western help the Soviet Union will be unable to develop Siberian offshore resources during the

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next 10-15 years. Proposed cooperative ventures with US and Japanese firms to develop Siberian natural gas deposits and offshore Sakhalin oil and/or gas deposits offer the USSR opportunity to obtain Western technology and equipment and to earn large amounts of hard currency through sale of liquefied natural gas (LNG) and oil.

Without Western assistance development of the Siberian chemical industry would be delayed by several years. If only US chemical technology is denied to the USSR, the penalties would be far less as other Western countries can provide almost equivalent technology for the most part. Nevertheless, US chemical technology is valued highly by the Soviets. The availability of credits will be an important factor in Soviet selection of Western contractors. If, for example, US credits are not competitive with those offered by Japan or Western Europe, US firms probably would provide mainly chemical technology, and other Western firms would provide the chemical equipment. At the present time US technology is to be used in at least 3 Siberian chemical projects: a vinyl chloride plant, a polystyrene plant, and 2 ammonia plants.

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Western assistance would also speed up the timetable for development of Siberian minerals and metals industries somewhat, but not decisively. The USSR has demonstrated strong capabilities in aluminum, copper, steel, and diamonds and should be able to achieve substantial gains on its own.

Nevertheless, the role of the West in Siberian development will not be settled in the next few years. Much will depend on Soviet experience with cooperative ventures and on Soviet success in going it alone. Judging by past history, growing frustration over the delays and difficulties of developing the eastern regions will incline the leadership to look for help in areas and on terms that would not be considered now.

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E. Impact of Siberian Development on Soviet Energy Needs and on World Energy Markets

Soviet Plans

If the USSR is to remain self-sufficient in energy, development of Siberian resources is an absolute necessity. Soviet sources expect total demand for energy to double during 1976-90, to a level of about 3.5 billion tons of hard coal equivalent (see Table 1).* Minister of Power and Electrification P.S. Neperozhny, in a paper presented at the recent World Energy Conference in Detroit, stated that 80% of the increase in Soviet production of energy from primary sources through 1990 will be obtained from Siberia. He also noted that enormous technical and economic problems would have to be solved to accomplish this task.

The potential impact of Siberian energy development on world markets lies overwhelmingly in oil and gas. Production of crude oil in West Siberia in 1975 is to reach 2.9 million b/d and account for about 30% of total Soviet output. Preliminary plans for 1980 call for West Siberian output to reach 6 million b/d, about half of total production. Although no plans for oil production after 1980 are available, Soviet energy forecasts imply an output of 15 million b/d of crude

* The projected 4.7% average annual rate of growth is slightly below the 5.7% rate attained during the 1960s. Both consumption and exports are expected to increase at a slower pace.

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Table 1

Soviet Energy Supply and Demand, 1960-90
(Million Metric Tons of Hard Coal Equivalent)^{1/}

	Actual 1960	Actual 1970	Plan 1975	Unofficial Soviet Forecasts ²	
	<u>742</u>	<u>1,288</u>	<u>1,763</u>	<u>2,200</u>	<u>3,500</u>
<u>Total Supply</u>					
Fuel production	692	1,233	1,639	2,011	2,983
Oil	211	503	721	821	1,070
Natural gas	54	234	382	583	1035-1104
Coal	373	433	484	540	723-794
Peat, shale, and wood	54	53	51	67 ³	84 ³
Hydroelectric power production	6	15	20	22	34
Nuclear power production	Negl.	4	9	43	345
Other energy sources	33	32	35 ³	40 ³	50 ³
Imports	11	14	60 ³	84 ⁴	88 ⁴
<u>Total Demand</u>	<u>742</u>	<u>1,288</u>	<u>1,763</u>	<u>2,200</u>	<u>3,500</u>
Consumption	678	1,118	1,500 ³	1,900	3,000
Exports	60	167	260 ³	300	500
Additions to stocks	4	3	3	Negl.	Negl.

1. Equivalent to 7,000,000 Kilocalories per metric ton.
2. Derived from various Soviet Sources.
3. Estimated.
4. Derived as a residual.

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oil in 1990 (Table 2). If 80% of the increase in crude oil output were to come from Siberia, as Neperozhny states, Siberian production in 1990 would total 8.4 million b/d and represent more than 55% of Soviet output. In recent months, however, high-level oil officials have expressed concern that technical problems will cause oil production in West Siberian fields to slow down in 5-6 years, at a time when consumption of liquid fuels will be rising steadily. If the increase in West Siberian oil production slows appreciably, total Soviet production of 15 billion b/d in 1990 is unlikely. An effort will be made to discover new oil resources in East Siberia, an area where logistic problems are worse than in West Siberia and where the geology is more complex. Given the length of time required for exploration, drilling, and pipeline construction, it is unlikely that any sizable output of oil could be obtained in this remote area before 1990.

Analysis of Soviet long-range energy forecasts (1975-90) reveals a changing pattern of oil and gas production. According to these forecasts, oil production is expected to increase at an average annual rate of only about 2.5% through 1990 compared with 8% per year during the past decade. Oil's share in total fuel production is scheduled to decline from about 45% in 1975 to about 35% in 1990, while the share of

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Table 2

Forecasts of Soviet Oil Supply and Demand,
1975-90

	<u>(Million Barrels/Day of Crude Oil Equivalent)</u>			
	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>
A. Soviet forecast¹				
Supply				
Crude oil production (from Siberia)	10.1 (2.9)	11.5 (4.6-5.2)	13.2 (6.0-6.4)	15.0 (7.4-8.0)
Imports	0.4	0.6	0.7	0.8
Total	<u>10.5</u>	<u>12.1</u>	<u>13.9</u>	<u>15.8</u>
Demand				
Domestic consumption ²	7.2	8.4	9.7	11.2
Available for export	<u>3.3</u>	<u>3.7</u>	<u>4.2</u>	<u>4.6</u>
To other Communist countries ³	1.6	2.2	3.0	3.8
To the West	1.7	1.5	1.2	0.8
B. Estimates based on continued high rate of consumption				
Supply				
Crude oil production (from Siberia)	10.1 (2.9)	11.5 (4.6-5.2)	13.2 (6.0-6.4)	15.0 (7.4-8.0)
Imports	0.4	0.6	0.7	0.8
Total	<u>10.5</u>	<u>12.1</u>	<u>13.9</u>	<u>15.8</u>
Demand				
Domestic consumption ⁴	7.2	9.6	12.9	17.2
Available for export	<u>3.3</u>	<u>2.5</u>	<u>1.0</u>	<u>(-1.4)</u>
To other Communist countries	1.6	2.2	1.0
To the West	1.7	0.3	0
C. More likely estimates				
Supply				
Crude oil production (from Siberia)	9.6 (2.9)	11.6 (6.0)	13.0 (7.0)	14.0 (8.0)
Imports	0.4	0.6	0.8	1.0
Total	<u>10.0</u>	<u>12.2</u>	<u>13.8</u>	<u>15.0</u>
Demand				
Domestic consumption ⁵	7.2	9.2	11.2	13.0
Available for Export	<u>2.8</u>	<u>3.0</u>	<u>2.6</u>	<u>2.0</u>
To other Communist countries	1.6	2.2	2.1 ⁶	1.5 ⁶
To the West	1.2	0.8	0.5 ⁶	0.5 ⁶

1. Based on information from numerous Soviet sources.

2. Increased during 1976-90 at an average annual rate of 3%.

3. The volume of oil available would permit Eastern Europe to increase oil consumption at an average rate of 6-7% per year during 1976-90.

4. Increased at an average annual rate of 6% during 1976-90.

5. Average annual rates of increase: 5% during 1976-80; 4% during 1981-85; 3% during 1986-90.

6. Assuming Soviet deliveries of Sakhalin oil to Japan.

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natural gas rises from less than one-fourth in 1975 to as much as one-third in 1990.

Outlook for Exports

According to long-range Soviet forecasts, the USSR will remain a sizable net exporter of oil. While the USSR will double imports from 400,000 b/d in 1975 to 800,000 b/d in 1990, net exports are to rise from about 2.9 million b/d in 1975 to about 3.8 million b/d in 1990. This volume of exports would provide the bulk of the oil needed by Eastern Europe to maintain a 6 to 7% rate of growth in oil consumption during 1976-90 and would at the same time maintain exports to the West at or near current levels (see Table 2). This position probably represents the best that the USSR could achieve with maximum western assistance.

Indeed, the USSR probably will have to reduce the rate of oil consumption by substituting more readily available natural gas where possible in order to maintain a net oil export position through 1990. A 5%-6% rate of growth in domestic consumption of oil (which is less than the 7-8% that prevailed over the past decade) when combined with the reduced rate of increase in production indicated by Soviet forecasts would require the USSR to be a net importer of oil during 1986-90 (case B in Table 2). The USSR undoubtedly

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will strive to avoid this situation and should be able to curb domestic consumption. A more likely estimate of the Soviet supply-demand situation for the period after 1980 (case C in Table 2) assumes an even lower rate of growth in production than is indicated by the Soviet forecast and declining rates of increase in consumption. The USSR would thus be a net ^{exporter of about 1} million b/d in 1990, an amount roughly equal to Soviet deliveries to Eastern Europe in 1973.

Without western assistance, either in the form of cooperative ventures or in the sale of equipment and technology, the USSR will be hard pressed to produce and deliver the increased amounts of gas required for an expanding domestic economy and for export. Forecasts for production of gas during 1980-1990 appear too high as they are based on plans for production in 1975 that subsequently have been reduced. Although some of the largest gas reserves in the world are located in the northern regions of Tyumen Oblast in West Siberia, development of these reserves is proceeding slowly because of the difficult permafrost conditions and the lag in construction of gas pipelines. Soviet long range forecasts of natural gas production (assuming a 7% average annual rate of increase) and a more likely estimate of output during 1976-90 (assuming an increase of 5% to 6% per year) are presented in Table 3.

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Table 3

Forecasts of Soviet Supply and Demand for Natural Gas,
1975-90

(Trillion cubic feet)

	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>
A. Soviet Forecast				
Supply				
Natural gas production (from Siberia)	11.3 (1.4)	17.1 (6.0)	23.7 (11.3)	30.4-32.5 (16.6-18.7)
Imports	0.5	0.7	1.1	1.1
TOTAL	11.8	17.8	24.8	31.5-33.6
Demand				
Domestic consumption ^{1/}	10.9	16.2	21.4	27.5-29.7
Exports:	0.9	1.6	3.4	3.9
To Eastern Europe	0.5	0.9	1.1	1.4
To Western Europe	0.4	0.7	0.9	1.1
To the US	0	0	1.1	1.1
To Japan	0	0	0.3	0.3
B. More Likely Estimate				
Supply				
Natural gas production (from Siberia)	9.7 (1.4)	13.4 (4.2)	17.7 (7.8)	21.2-23.0 (10.6)
Imports	0.5	0.7	1.1	1.1
TOTAL	10.2	14.1	18.8	22.3-24.1
Demand				
Domestic consumption ^{1/}	9.3	12.5	15.4	18.4-20.2
Exports:	0.9	1.6	3.4	3.9
To Eastern Europe	0.5	0.9	1.1	1.4
To Western Europe	0.4	0.7	0.9	1.1
To the US	0	0	1.1	1.1
To Japan	0	0	0.3	0.3

^{1/} Obtained as residual (supply-exports).

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Implications for the Soviet Hard Currency Position

The USSR has every reason to push oil and gas production beyond the margin of Soviet and East European requirements since the sale of energy products is a key factor in its hard currency exports. Soaring oil prices have made the difference between surplus and deficit in the USSR's hard currency trade account. Earnings from the sale of oil in 1974 may reach \$3 billion, more than 40% of total projected Soviet hard currency earnings. Hard currency revenues from the sale of oil should continue to rise for a while perhaps reaching \$5 billion. As suggested above, however, the amount of oil available for sale to the West will level off around 1980 as increased production from existing sources is matched by increased domestic demand and commitments to Eastern Europe. After 1980, further price increases would be needed to keep annual dollar earnings around the \$5 billion mark.

The increasing natural gas deliveries to Western Europe under current contracts during the balance of the decade will help fill the breach. By 1980 annual hard currency earnings from gas exports could reach \$1.3 billion. Earnings from coal exports will also rise, largely as a result of the Soviet-Japanese agreement to develop the Chul'man deposits. Earnings from coal and coke, forecast at \$200 million in 1974, could reach \$400 million by 1980.

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If new sources of oil and gas are not developed by the end of the 1970s, the growth in Soviet hard currency earnings could fall off drastically, limiting the growth of Soviet imports from the West. In the absence of new arrangements, 1985 earnings from the sale of oil, natural gas, coal and coke should reach roughly \$6 billion, perhaps 15% less than in 1980. But if the Soviets are successful in obtaining Western assistance in the development of the West Siberian East Siberian (Urenqoy) and (Yakutsk) natural gas deposits and the offshore natural gas and oil deposits surrounding Sakhalin, earnings from these new sources would more than cover the expected decline in exports from traditional areas. In any event, coal exports from the Chul'man basin will probably approach \$1 billion by 1985, cushioning the effect of any decrease in oil and gas exports to the West. Combined annual earnings from the above three projects alone could exceed \$5 billion by 1985.

During 1985-90, additional development of the Sakhalin area and/or the development of other offshore deposits could provide additional sources of hard currency earnings. Moreover, as noted in Table 3, an increase in natural gas exports to Western Europe during the 1980s remains a distinct possibility; Italy and Austria have already voiced their interest in receiving additional supplies.

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Implications for US and World Energy Supplies

Regardless of the effort undertaken by the Soviets to develop Siberian oil and gas resources during the next 15 to 20 years, with or without western assistance, the USSR will not be a major factor in world energy trade

- If the proposed cooperative ventures for exploration of Soviet natural gas deposits by the US and Japanese firms materialize, the liquefied natural gas (LNG) delivered to the US and Japan will represent at best only 1% to 2% of the total energy supply in either country.
- Even if the Sakhalin offshore venture is successful, oil exports from this area through the 1980s are likely to represent only a very small share of world oil trade or of supplies to Japan.
- While Soviet exports of natural gas to Western Europe may constitute as much as 10% of the importing countries' total gas supply during the 1980s, they will account for only a very small share of their total energy supply.

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F. US Trade and Investment Opportunities in Siberia

The Range of Opportunities

US-Soviet trade negotiations have already dealt with many large projects in Siberia, and a number of other proposals are likely to turn up in the next 20 years. Most of those proposed or expected would involve large, long-term US credits, would result in large-scale US exports of machinery and equipment, and would eventually be repaid by Soviet exports of the products of these development projects. The opportunities cover a range of industries -- energy related, metallurgical, automotive, chemical, and infrastructure. At this point, the largest and most promising projects seem to be in the energy and metallurgical fields.

Energy-Related Projects

The US has been negotiating two gas projects with the USSR. One, a joint effort with Japan to develop natural gas deposits in the Yakutsk region in Eastern Siberia, has been pending since a general agreement was signed in 1973. Firms in Japan and the US have agreed to invest \$100 million each in exploratory drilling to verify the reserves claimed by the USSR. Additional

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financing would be required for a 1,200-mile pipeline from Vilyuyesk to Nakhodka on the Pacific coast and for liquefaction and port facilities. Western plant and equipment from the US and Japan would cost an estimated \$3 billion with investment. In return, the USSR would deliver 1 billion cf/d to the US and to Japan. An agreement was signed on 22 November 1974 among all participants to undertake the exploration phase of the venture. However, US participation is contingent upon Eximbank financing.

North Star, an LNG project involving only the US, would be a cooperative venture between the USSR and three US firms. The US firms would supply gas well equipment for development of the large Urengoy deposits in Western Siberia, large diameter pipe and other pipeline equipment, liquefaction and port facilities at Murmansk, and technical know-how. US investment would be \$3.5 billion, and the consortium is seeking Eximbank participation in the amount of \$1.25 billion. In return, the USSR would supply 2 billion cf/d of LNG over a 25-year period. Difficulties over financing, pricing, and last minute Soviet demands for additional plants and oilfield equipment have stalled negotiations in 1974.

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A Soviet oil development project under negotiation also involves joint US-Japanese participation. Gulf Oil and a Japanese consortium have agreed to explore one area off the northeast coast of Sakhalin and will provide \$100-\$200 million in long-term financing. The consortium will receive a long-term option to purchase 50% of all oil recovered. Total Western investment to explore and develop one or two major offshore oil fields might exceed \$1 billion. Gulf Oil is participating in return for sole rights to explore other offshore areas surrounding Sakhalin under a more lucrative arrangement, which could result in an additional \$1 billion investment.

A long-range development possibility late in this period could be US participation in offshore exploration and development in the Kara Sea. US investment could amount to \$2 billion, presumably with some sort of product payback arrangement.

Metallurgical Projects

Kaiser Corporation has signed a preliminary agreement with the USSR to provide \$1.4 billion in Western equipment on long-term credits for a 1 million ton-per-year alumina refinery, a 500,000 ton-per-year aluminum reduction plant,

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and a large rolling mill. The reduction plant presumably would be located near the Krasnoyarsk hydroelectric plant. Kaiser might help to develop also ^A bauxite deposits, but the location of these deposits has not been ^A specified. If a contract is signed, Kaiser would form an international consortium to help manage the project as well as to market the aluminum supplied by the Soviets in repayment of the Western credits. The USSR has also told Kaiser of its interest in building one or two additional large aluminum complexes, which could involve an additional \$1 billion^A investment, but plans are unclear and seem geared to a time period near 1990. Another billion dollar aluminum project is currently under negotiation with a French firm.

Infrastructure Development

The USSR is pushing ahead on construction of the Baykal-Amur Magistral (BAM) railroad across Siberia. Soviet purchases of Western equipment for this line are expected to total \$2 billion, of which \$500 million in contracts have already been signed. The US has received \$100 million in contracts so far and is expected to receive additional large contracts.

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participation are difficult to determine because plans for the development of infrastructure are far from settled and

because the extent of raw materials deposits is uncertain. Much of the seemingly heavy investment in the early period may spill over into the later periods, both because contract negotiations may be protracted and because construction probably will fall behind schedule.

In the next 20 years, US contributions to Siberian or Far Eastern projects are most likely in the Sakhalin offshore oil and gas deposits, the Yakutsk LNG project, the aluminum complex with Kaiser, the BAM railroad line, the truck plant at Krasnoyarsk, and petrochemical combines at Tomsk and Tobolsk. Projects less likely, but possible, in this period include the North Star LNG project, a second Sakhalin offshore oil project, additional aluminum complexes, and some participation in mining projects. For example, US firms may help in developing the Udokan copper deposits east of Lake Baikal. Costs for this mammoth project may exceed \$2 billion and would entail large orders for Western equipment. In addition, the United States will be selling equipment for use in other projects involving other Western countries.

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Investment through 1980 for the most probable projects with Western help could be about \$10 billion, of which the US share might be about half. Another \$4 billion in projects are possible for this same period, and the US share could be \$3.5 billion (the North Star project).

Although projects for the 1980s are especially hard to evaluate, further development and large Western investment can be expected. Completion of the new rail line and its associated facilities will open formerly inaccessible areas to development. New power sources will attract large power-consuming metal industries in Siberia. Development of the Siberian gas fields will encourage development of chemical plants, and the need for oil will undoubtedly spur development of offshore fields. Nonetheless, we do not know enough about Soviet plans to identify more than about \$10 billion worth of projects in the period after 1980. These projects have been mentioned by Soviet officials in talks with Western nations and cover further development of energy resources, power consuming metallurgical plants, mining, and pulp and chemical plants.

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Western Investment in Soviet Siberia

Project	Value of Potential Western Involvement	Status	US Participation
Yakutsk LNG Development	\$3 billion	Probable	US firms have 50% participation
Sakhalin Offshore Oil Exploration and Development	\$100 million-\$1 billion	Probable	Gulf Oil involved in negotiations
Baykal-Amur-Magistral Railroad	\$2 billion	Probable	To date US firm has obtained \$100 million contract for tractors
Chul'man Coal	\$450 million	Certain	Minor equipment sales
Forestry Development	\$550 million-\$2.0 billion	Probable	None expected
Aluminum Production Complexes	\$1 billion-\$2.5 billion	Probable	Kaiser now negotiating for \$1.5 billion contract
North Star LNG Development	\$3.5 billion	Probable	US-Soviet deal
TOTAL	\$10 billion-\$14 billion		\$3 billion-\$7 billion

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Western Investment in Soviet Siberia
(Continued)

Further areas for additional Western involvement	1980-1990	US Participation
Chemical Plants		Probable
Offshore Oil		Probable
Aluminum Refining		probable
Copper Development		Possible
Coal Development		Minor
Forestry Development		Minor
Truck Plant		Probable
Steel Plants		Possible
Other Resource Development		Possible

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Implications for US-Soviet Trade, Credits, and Technology Transfer

US investment in Siberian projects could produce large US export surpluses in 1975-85 as a result of machinery and equipment deliveries. In addition, the US will secure large contracts associated with Siberian projects involving other Western nations. For example, US technology and know-how are essential to the Siberian mainland and offshore oil and gas projects. US equipment and know-how are also sought for metallurgical projects in Siberia. In the later stages of the period, Soviet deliveries of the oil and gas from these projects would greatly increase Soviet exports to the United States. Soviet trade with the United States could show a surplus in the 1980s unless US exports for other projects offset US imports of energy and raw materials.

The magnitude of the probable US investment in Siberian development projects through 1980 -- \$4.5 billion -- raises the question of how it is to be financed. Adding the possible \$3.5 billion investment for the North Star project in this period accentuates the problem. If the USSR follows its usual practice of demanding maximum credits at low rates of interest, US firms would not participate in some of the projects. Under new regulations proposed by Congress, Eximbank participation will be more limited and less competitive than the government-sponsored credits of certain

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Western European countries and Japan. The large LNG projects, which entail maximum Eximbank participation at the lowest interest rates available, would be most affected. The other projects would not seem to be endangered by the new Eximbank regulations. US credits might be important to the timing of these projects, but the USSR can find alternative sources or go it alone.

In energy and mining the USSR would benefit from superior US technology and equipment and from US managerial, planning, and engineering skills, although as in turnkey plants and piecemeal acquisition, Soviet ability to master the technology and blend it with domestic machinery has been limited. The gas, oil, and mining projects in Siberia would provide opportunities for the Soviets to observe and improve their managerial, planning, and engineering skills -- areas they now recognize as needing an infusion of Western know-how.

In fact, in several of these projects the United States clearly possesses the best technology in the world or is indeed the sole supplier. In the petroleum industry, the United States is acknowledged to be the best supplier of complete systems for onshore, offshore, and permafrost exploration, production, and pipelining. In the automotive field, the United States has the best specialized machine tools (e.g., transfer machines) for high volume output and

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computerized warehousing systems, and it is probably the only source for the design of very large automated foundries. With the pressing construction needs in Siberia, the United States is the sole supplier of heavy duty industrial tractors and the largest sizes of earth-moving equipment, such as front-end loaders and dump trucks.

One new advantage that the Siberian projects offer the Soviet is the long period of exposure to advanced Western technology, know-how, and operational skills because of the extended period of development in this area. Energy projects using Western, particularly US, technology and operations could extend for as long as 15 to 20 years if all projects discussed above are started. The same time-frame probably applies to mining. Long exposure to Western know-how and management techniques should facilitate the technology transfer embodied in these projects.

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